Technical **Bulletin** TB93-3

Agricultural Experiment Station
Department of Agronomy
USDA/Agricultural Research Service
Natural Resources Research Center
May 1993

Sustainable Dryland Cropping Systems: Economic Analysis

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SUSTAINABLE DRYLAND CROPPING SYSTEMS: ECONOMIC ANALYSIS

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A Cooperative Project

of the
Colorado Agricultural Experiment Station
Department of Agronomy
Colorado State University
Fort Collins, Colorado

and the

USDA - Agricultural Research Service
Natural Resources Research Center
Great Plains Systems Research Unit
Fort Collins, Colorado

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SUMMARY

Intensive cropping systems have increased total grain yields and productivity per unit of rainfall by 75-100% in all climate zones in eastern Colorado. Cropping systems, like wheat-corn-fallow (WCF), increased net return to land, labor, capital, management, and risk by 25-40% compared to conventionally managed wheat-fallow (WF) in Northeastern Colorado. A wheat-corn-millet-fallow (WCMF) system increased net return 13-27%. The WCMF had less profit than WCF because of low millet prices. However, in cases where grassy weeds are a major problem it may be the best choice.

Net returns to land, labor, capital, management, and risk for Southeastern Colorado were not as favorable as in the Northeast. Lower grain production in the Southeast, compared to the Northeast, decreased gross income. This occurred even though yields in our Southeastern Colorado experiments exceeded local yield averages by about 35%. The costs associated with herbicidal weed control are large, compared to the total income produced with the more intensive systems. Intensive rotations, such as wheat-sorghum-fallow (WSF) conducted with stubble mulch tillage during the fallow preceding wheat, had about 23% less net return than conventionally tilled WF systems. However, reduced till WF and WSF produced similar net returns, and would definitely meet residue compliance requirements.

Current residue requirements dictated by the Farm Bill are causing dryland farmers concerns regarding their ability to comply. The integration of intensified cropping systems managed under minimum and no-till will allow compliance with residue standards <u>and</u> could result in an economic advantage over presently used systems. The economic advantages are great in Northeastern Colorado. In Southeastern Colorado the economic advantage does not exist at the present time. Detailed economic analyses of the various cropping systems are outlined in this publication.

PURPOSE

The intent of this publication is to compare the economic outcomes of more intensive cropping systems with conventional wheat-fallow systems. Although actual dollar values are reported for specific systems, the key information is the relative return of one system versus another. Obviously, input costs vary from farm to farm and county to county, and therefore actual returns may not fit any one grower. This publication should not be used as a means of assessing income levels of dryland farmers, but as a means of comparing economic values of alternative systems. Relative system comparisons are most valid because they assume equal levels of management, land resources and soil productivity.

INTRODUCTION

Colorado agriculture is highly dependent on precipitation from both snow and rainfall. Each unit of precipitation is critical to crop production. At Akron one additional inch (25 mm) of water above the amount needed to get the first bushel of yield results in 4.5 bu/A of wheat (302 kg/ha), consequently profit is highly related to water conservation (Greb et al. 1974) .

A research project was established in 1985 to address efficient water use under dryland conditions in Eastern Colorado. A more comprehensive justification for its initiation has been reported previously (Peterson et al. ,1988). The general objective of the project is to identify dryland crop and soil management systems that will maximize water use efficiency of the total annual precipitation, while at the same time enhancing quality of the natural resource base. Specific objectives are to:

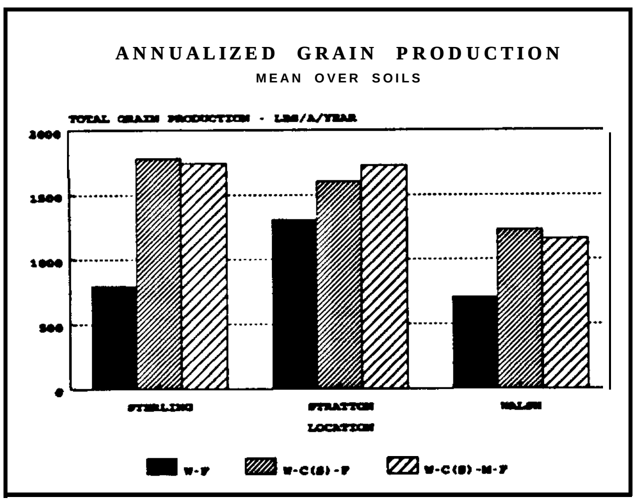
1. Determine if cropping sequences with fewer and/or shorter summer fallow periods are feasible.
2. Quantify the relationship of production to climate (precipitation and evaporative demand), soil type and cropping sequences that involve fewer and/or shorter fallow periods.
3. Quantify the effects of long-term use of no-till management systems on soil structural stability, micro-organisms and faunal populations of the soil and the organic, N and P content of the soil, all in conjunction with various crop sequences.
4. Identify cropping or management systems that will minimize soil erosion by crop residue maintenance.
5. Develop a data base across climatic zones that will allow economic assessment of entire crop management systems.

The purpose of this publication is to compare the economic outcome of more intensive dryland cropping systems to conventional wheat-fallow practices. This is in partial fulfillment of objective No. 5 above, based on 1988-1992 data. As our data base increases, the analysis will be updated periodically.

The Dryland Agroecosystem Project was established in the fall of 1985 and the first harvest year was 1986. Peterson et al. (1988) , documented details of the project in the “start up” period and data from the 1986-87 crop year. Experimental design, management details, and annual results from the 1988 - 1991 crop years have been reported by Peterson, et al. (1989, 1990, 1991, and 1992). Yield results from 1986 and 1987 are of little use in ascertaining the overall implications of cropping systems because yields were more a function of recent cropping history by the individual farmer than our new cropping systems. Therefore, our economic analyses are based on results obtained from 1988-1992 (five cropping seasons). All crops are present in each system each year, which is critical to the assessment of yearly climatic effects and the interpretation of data over the long-term.

The figure below shows the annualized grain production by cropping system and site averaged over all soils. All yields were annualized to account for the nonproductive fallow year. For example, the wheat yields in wheat-fallow system are divided by 2 because it takes two years to produce one crop.

The wheat-corn-fallow (3 year) and wheat-corn-millet-fallow (4 year) systems increased average annualized grain production by 72% compared to wheat-fallow. Gains in production by intensifying systems require added inputs such as more herbicides, fertilizers and management skills. This report will address the economic issues associated with the wheat-fallow (WF), wheat-corn-fallow (WCF), and wheat-corn-millet-fallow (WCMF) cropping systems.



METHODS AND ASSUMPTIONS

Three parameters are being studied in the Dryland Agroecosystem Project: Climate gradient, Soil gradient and Cropping System. The climate gradient covers a range of potential evapotranspiration from north to south in eastern Colorado. The Sterling site has an average growing season open pan evaporation of 42 inches while Stratton and Walsh have 50 and 75 inch evaporations, respectively. All three sites average 16-17 inches of precipitation per year. There are three soils at each site as delineated by topographic position: Summit, Sideslope, and Toeslope. Five different cropping systems are being studied over the soil gradient at each site. This analysis focuses on three of those systems. Complete details of the experiment can be found in the publications cited above.

The cropping systems at Sterling and Stratton included corn and proso millet, but grain sorghum replaces corn and annual forage sorghum replaces proso millet at the Walsh site. Grain sorghum was the crop of choice from the outset at Walsh because the climate was not thought to be suitable for dryland corn. Annual forage was substituted for proso millet at Walsh in 1991 because of repeated failures of the millet crop in that hotter climate. To date the experiments at Sterling and Stratton have behaved similarly and so a combined economic analysis for those systems is justified. However, the lower yielding site, Walsh, which contains grain sorghum and annual forage substituted for corn and proso millet, respectively, will be analyzed separately.

Cost and return budgets were developed on a per acre basis using average yields for each rotation for two scenarios: 1. Northeastern Colorado (Sterling & Stratton) and 2. Southeastern Colorado (Walsh). Data from the Northeastern area apply to climatic zones from Cheyenne county and north and data from the Southeast to areas south of Cheyenne county.

Our experiences with herbicides, as described in the annual reports cited in the Introduction, have led to a “best herbicide management” option that is used in this economic analysis. Budgets with tillage substituted for herbicide treatments during fallow also have been calculated. In these cases it is assumed there is no loss in wheat grain yield as compared to a complete no-till system, based on experiences of other researchers.

Returns for wheat include government program benefits reflecting a $4.00 per bushel target price, a 32-bushel per acre Northeast and 24-bushel per acre Southeast, program yield, 95% planted base and deficiency paid on 80% of base acres. Returns for corn include no government program benefits because it is assumed that most WF farms do not have a feed grain base. Farmers who do have a feed grain base can take advantage of that with these systems to further increase net returns. Price per bushel was set at $2.30, which is near the average farm gate price received by Colorado farmers in the last 13 years. Grain sorghum price used in the analysis was $2.25 per bushel ($4.02/cwt). Proso millet price was set at $2.50 per bushel ($5.00/cwt), which is the average price for the last 10 years. The price of forage sorghum hay was $50 per ton based on information from Southeastern Colorado. Budgets by crop were calculated as a first step for all systems. These budgets were then used to simulate returns on typical 1200 acre farms of two geographic areas. Typical farms in Logan and Baca counties were used as models for the northeast and southeast areas, respectively.

Yields in each cropping system are measured on each soil of each rotation; summit, sideslope, and toeslope positions (Table 1). Yields used in the economic analyses were weighted according to the average proportion of soils that occur in a geographic area represented by each of the three soil positions (Table 2). Soil distributions for Logan county were used for Northeastern CO, and Baca county soil distributions were used for Southeastern Colorado. Weighted yields used in the economic analysis are given in Table 3.

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Table 1. Crop yields (1988-92) averaged across soil and geographic area.

Crop	Geographic Location					
	Northeast			Southeast		
	Summit	Side	Toe	Summit	Side	Toe
	Bu/A					
Wheat	35	35	49	26	33	40
Corn (Sorghum)	68	74	104	(33)	(44)	(71)
Millet	34	35	44			
	T/A					
Forage				1.08	1.12	1.71

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Table 2. Distribution of soil types in Logan and Baca counties that are similar to soil positions in the Dryland Agroecosystem project.

soil Position	County	
	Logan	Baca
	%	
Summit	20	30
Sideslope	40	30
Toeslope	40	40

Table 3. Crop yields used in the economic analysis weighted by soil type distribution in each geographic area .

Crop	Geographic Location Northeast	Geographic Location Southeast
	----Bu/A----	
Wheat	41	
Corn (Sorghum')	85	(52)
Sorghum (Continuous)		45
Millet	38	
	----T/A----	
Forage		1.3

•Based on yields in Table 1 and soil distribution in Logan and Baca counties as shown in Table 2.
1 = Sorghum in WSF and WSHF rotations.

RESULTS AND DISCUSSION

System Costs:

Corn, sorghum, and millet production were evaluated using only no-till practices preceding planting. Each overall cropping system was evaluated with three different tillage options during the fallow period that precedes wheat planting. Tillage options during the fallow period preceding wheat planting ranged from conventional stubble mulch to complete no-till (Table 4) . Specific numbers and types of operations associated with each crop and tillage-herbicide combination are presented in Appendix Tables A1-A4.

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Table 4. General description of tillage and herbicide combinations used only in the fallow period preceding wheat planting .

Fallow Period Preceding Wheat Planting	Tillage	Herbicide
Conventional Stubble Mulch	7 operations with sweeps and rodweeders	None
Reduced Till	3 operations with sweeps and rodweeders	Post harvest herbicide
No-Till	None	Post harvest herbicide and 3 applications of contact herbicides

The gross return and costs by individual crop and tillage combinations are shown in Tables 5 & 6. Production costs associated with each crop were partitioned into preharvest and harvest portions. Specific details on costs are reported in Appendix Tables A5-A21.

Preharvest costs are a critical point in the analysis because they are a primary control on net return to land, labor, capital, management and risk in all systems. Harvest costs, although slightly different among crops, only varied by a maximum of $9.50/A. Preharvest costs varied from as low as $27.51/A for millet in Northeast Colorado to as high as $67.89/A for sorghum in Southeast Colorado. *For* wheat, preharvest costs increased from $36.09/A with conventional tillage to $56.62/A with total substitution of herbicides for tillage. Obviously net income can be greatly affected by changes in preharvest costs. Although corn had the highest preharvest costs, $65.85/A, they were offset by the highest gross return, $195.50/A.

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Table 5. Costs and return to land, labor, capital, management, and risk using three types of tillage practices for wheat, and no-till practices for corn and millet in Northeastern Colorado.

	WHEAT CONVENT. TILL	WHEAT REDUCED TILL	WHEAT NO-TILL	CORN NO-TILL	MILLET NO-TILL
	Dollars per Acre				
GROSS RETURN	154.00	154.00	154.00	195.50	95.00
PREHARVEST COST	36.09	42.24	56.62	65.85	27.51
HARVEST COST	20.33	20.33	20.33	29.05	21.66
DIRECT COST	56.42	62.57	76.95	94.90	49.17
RETURN OVER DIRECT COST	97.57	91.42	77.04	100.60	45.83
OWNERSHIP COST	22.86	22.86	21.88	20.49	23.16
RETURN AVAIL. FOR LAND, LABOR, CAP., MGT. & RISK	74.71	68.56	55.16	80.11	22.67

Table 6. costs and return to land, labor, capital, management, and risk using three types of tillage practices for wheat, and no-till practices for sorghum and forage in Southeastern Colorado.

	WHEAT CONVENT. TILL	WHEAT REDUCED TILL	WHEAT NO-TILL	SORGHUM NO-TILL	FORAGE NO-TILL
	Dollars per Acre				
GROSS RETURN	126.38	126.38	126.38	117.00	65.00
PREHARVEST COST	36.09	42.24	56.62	67.89	38.65
HARVEST COST	19.42	19.42	19.42	21.76	20.00
DIRECT COST	55.51	61.66	76.04	89.65	58.65
RETURN OVER DIRECT COST	70.87	64.72	50.34	27.35	6.35
OWNERSHIP COST	22.86	22.86	21.88	19.46	14.08
RETURN AVAIL. FOR LAND, LABOR, CAP., MGT. & RISK	48.01	41.86	28.46	7.89	-7.73

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Ownership costs associated with each crop and tillage combination ranged from $14.08/A to $22.86/A, a variation of $8.78/A depending on geographic area (Tables 5 & 6). These costs do not vary as much as direct costs because machinery ownership has a depreciation cost independent of yield level and numbers of operations. The range in ownership costs results from the difference in type and amount of machinery needed for production of each crop as well as tillage method for the period preceding wheat planting.

Comparisons of the three tillage options in the wheat phase of each system show that substitution of herbicidal weed control for tillage increases preharvest costs and ultimately total direct costs. Although the largest return to land, labor, capital, risk and management is achieved with the conventional stubble mulch tillage system (Tables 5 & 6) preceding wheat planting, this system may not comply with SCS residue requirements. Each tillage operation decreases residue cover. For example, a total of seven tillage operations (5 with sweeps and 2 with rod weeders) would incorporate 50-60% of the crop residue. In some cases this could result in “noncompliance” and the loss of government payments; this would be $12 and $16/A loss in gross income in Southeastern and Northeastern Colorado, respectively. No-till results in lower returns because of the larger direct cost of chemicals for weed control. Direct costs increase by over $20/A as compared to conventional stubble mulch tillage. However, compliance with SCS residue requirements definitely would not be a problem. The reduced tillage wheat production system, with a mixture of herbicidal and mechanical weed control, would allow compliance and keep direct costs in a nominal range. Reduced till increased direct costs by about $8/A as compared to conventional tillage (Tables 5 & 6). We have assumed no differences in wheat yield as affected by tillage choice because Colorado and Nebraska research has shown that well managed tilled fallow preceding wheat planting can produce yields equivalent to yields with no-till fallow. If a grower had not been doing a good job with conventional tilled fallow, it is possible that switching to reduced till or no-till may result in increased grain yields that could compensate for the additional $8/A of direct cost.

Farm Basis:

The "farm basis" cost and returns to land, labor, capital, management and risk are based on a 1200-A farm. Gross returns, costs, and net income by crop do not allow comparison of the overall effect of cropping system. Each system was evaluated with three different tillage options (Table 4) for the fallow phase preceding wheat planting. In each farm example there "flex" acre that could be planted to non-program crops. These acres are always included in the fallow budgets for costs, but no return is associated with them. It was assumed in our analysis that use of these acres for a non-program crop would add equally to net returns. Actual dollar amounts for each 1200-A farm are given in Appendix Tables A5-A21. Systems are compared on a relative basis in each geographic area in the following paragraphs.

Northeastern Colorado:

Wheat-fallow with conventional stubble mulch serves as the basis of comparison for all other cropping system and tillage combinations. In eastern Colorado this system often leaves little residue cover by wheat planting time. Our typical 1200-A WF farm in Northeastern Colorado managed with conventional stubble mulch tillage had a net return to land, labor, capital, management, and risk of $41,768 per year (Table 7). Integrating reduced or no-till into a WF system resulted in a decrease in returns compared to conventional tillage. However, conventional till WF may not comply with SCS residue requirements unless strip cropping or other erosion control practices also are used. Failure to comply would result in the loss of deficiency payments (-$9485/year), which decreases the base value to $32,283 per year. This obviously would change the relative comparison to systems that do comply with residue requirements.

Both WCF and WCMF cropping systems with all tillage options increased net return compared to WF conventionally tilled. A shift to reduced till WCF would increase net return by 36%, compared to conventionally tilled WF. No-till, although less profitable than reduced tillage, still increased net income by 25%. The WCMF system resulted in gains ranging from 13 to 27%

Table 7. Actual and relative return to land, labor, capital, management, and risk on a 1200-acre farm basis, as affected by cropping system and tillage practice during fallow preceding wheat planting in Northeastern Colorado.

Tillage Preceding Wheat Planting	Cropping System					
	WF		WCF		WCMF	
	Actual $	%	Actual $	%	Actual $	%
Conventional	$41,768	Base*	$58,691	+40	$52,879	+27
Reduced	$38,530	-8	$56,673	+36	$50,222	+20
No-till	$30,028	-28	$52,274	+25	$47,282	+13

*Base = All returns compared to WF conventional tillage.

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depending on tillage choice. With millet prices used in this analysis, WCMF is not as profitable as WCF. However, in cases where a grower had a jointed goatgrass problem or other grassy weed problems, the longer WCMF rotation may be necessary to break the weed cycle. In that case it would be the best and most profitable system. If millet prices are calculated at $3.50/Bu, instead of $2.50/Bu, the net returns are equal to WCF.

Southeastern Colorado:

Our typical 1200-A farm in Southeastern Colorado managed with a WF conventional stubble mulch tillage system had a net return to land, labor, capital, management, and risk of $26,550 per year (Table 8). This farm has a wheat base only. As managed in our analysis scenario, this farm probably would not comply with SCS residue requirements. The loss in deficiency payments, (-$7,114/year) , would decrease the base value to $19,436 per year if noncompliance occurred.

Table 8. Actual and relative return to land, labor, capital, management, and risk on a 1200-acre farm basis, as affected by cropping system and tillage practice during fallow preceding wheat planting in Southeastern Colorado. (Wheat base only)

Tillage Preceding Wheat Planting	Cropping System					
	WF		WSF		WSHF	
	Actual $	%	Actual $	%	Actual $	%
Conventional	$26,550	Base*	$20,570	-23	$16,858	-37
Reduced	$23,312	-12	$18,552	-30	$15,450	-42
No-till	$14,810	-44	$14,152	-47	$14,220	-46

*Base = $26,550/Year/1200-A Farm

With the herbicide costs we have encountered in our research, none of the extended cropping systems increased net income relative to conventional stubble mulch WF (Table 8). The primary reason is that herbicide costs associated with the fallow period after wheat and before sorghum, plus the herbicide costs during grain sorghum production are high. Sandbur has been the weed most responsible for the high herbicide costs. Furthermore, grain sorghum yields in Southeastern Colorado have been lower than corn yields in Northeastern Colorado, which dramatically decreases gross returns. Sorghum yields averaged 52 bu/A from 1988-92 (Table 3), which is 20 bu/A greater than recent average dryland grain sorghum yields in Baca County Colorado. Our relatively high wheat yields, 34 bu/A (Table 3), which is 9 bu/A greater than the Baca County yield average, also favors WF. So the problem is not lack of productivity, but too much cost compared to production gains.

Southeastern Colorado farms often have a feed grain (sorghum) base because of a historical presence of grain sorghum in that area. Some growers even produce continuous grain sorghum. Therefore, another analysis was made using the same 1200-acre farm but with a cropping base for both wheat and grain sorghum. The Baca County sorghum yield base of 23 bu/A and a target price of $2.60/bu were used in this second analysis (Table 9).

Performance of intensified systems compared to WF still were not as economical as conventional tilled WF. However, changing to a WSF or WSHF systems, did not decrease returns as much as when the farm only had a wheat base. Identical grain yields were used in all comparisons, and so the income gains are due only to the deficiency payments received for the sorghum.

Table 9. Actual and relative return to land, labor, capital, management, and risk on a 1200-acre farm basis, as affected by cropping system and tillage practice during fallow preceding wheat planting in Southeastern Colorado. (Wheat and Sorghum Crop Bases)

Tillage Preceding Wheat Planting	Cropping System					
	WF		WSF		WSHF	
	Actual $	%	Actual $	%	Actual $	%
Conventional	$26,550	Base*	$23,628	-11	$19,151	-28
Reduced	$23,312	-12	$21,610	-19	$17,743	-33
No-till	$14,810	-44	$17,210	-35	$16,513	-38

*Base = $26,550/Year/1200-A Farm

Since the ability of producers to comply with residue requirements using conventional tillage in WF is highly questionable, a more logical comparison would be reduced till WF versus other systems, as has been done in Table 10. The WSF system with conventional tillage during the fallow period preceding wheat is a feasible option, but actually results in about the same net return, +1%, as reduced till WF. The primary advantages of the WSF rotation would be increased residue retention, increased crop diversity for weed control, and marketing.

Table 10. Actual and relative return to land, labor, capital, management, and risk on a 1200-acre farm basis (using reduced till WF as a base value), as affected by cropping system and tillage practice during fallow preceding wheat planting in Southeastern Colorado. (Wheat and Sorghum Crop Bases)

Tillage Preceding Wheat Planting	Cropping System: WF Actual $	WF %	WSF Actual $	WSF %	WSHF Actual $	WSHF %
Conventional	-----	---	$23,628	+1	$19,151	-18
Reduced	$23,312	Base*	$21,610	-7	$17,743	-24
No-till	$14,810	-36	$17,210	-26	$16,513	-29

*Base = $23,312/Year/1200-A Farm

Growers not faced with a sandbur weed control problem could in all likelihood decrease herbicide costs by $10/acre, which would create the scenario shown in Table 11. Note that the WSF rotation qains 18% in net return relative to WF. Growers should be very selective in their choices of herbicide options when considering changing to more intensive rotations.

Table 11. Actual and relative return to land, labor, capital, management, and risk on a 1200-acre farm basis, as affected by cropping system and tillage practice during fallow preceding wheat planting in Southeastern Colorado. (Reduced herbicide costs) and (Wheat and Sorghum Crop Bases)

Tillage Preceding Wheat Planting	Cropping System: WF Actual $	WF %	WSF Actual $	WSF %	WSHF Actual $	WSHF %
Conventional	-----	---	$27,428	+18	$22,001	-6
Reduced	$23,312	Base*	$25,410	+9	$20,593	-12
No-till	$14,810	-36	$21,010	-10	$19,363	-17

*Base = $23,312/Year/1200-A Farm

Continuous grain sorghum, a popular option in Southeastern Colorado, has had an average yield of 45 bu/acre, when practiced with no-till in our experiments, compared to sorghum yields of 52 bu/acre in no-till rotations (Table 3). Despite this relatively good yield it has not been profitable because of the high herbicide costs associated with our management (Appendix Table A20). Shatter cane problems also have been increasing in our continuous sorghum treatments to the point where we may not be able to continue with the system. Crop rotation may be the only solution to this weed problem.

SUMMARY AND CONCLUSIONS

Our results to date show that intensive cropping systems definitely increase total grain yields and productivity per unit of rainfall received in all climate zones in eastern Colorado. Intensive cropping systems, like WCF, increased net return to land, labor, capital, management, and risk by 25-40% over WF depending on the fallow tillage system chosen in Northeastern Colorado. A WCMF system increased net returns 13-27%. Using a proso millet price of $2.50/bu, the most intense system was not economically advantageous compared to WCF, but it may be the best choice in cases where grassy weeds are a major problem.

Net returns to land, labor, capital, management, and risk for Southeastern Colorado were not as favorable as in the northeast. Lower grain production in the Southeast compared to the Northeast decreased gross income. This occurred even though the yields in our experiment exceeded Baca County average yields by about 35%. The costs associated with herbicidal weed control were very high, compared to the yield gain associated with the increase in water use efficiency. Intensive rotations, such as WSF conducted with stubble mulch tillage during the fallow preceding wheat, resulted in about 23% less net return than conventionally tilled WF systems. However, if residue compliance is a problem, then reduced till WF and WSF were similar.

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APPENDIX TABLES

Table Al. Wheat herbicide programs used in economic analyses.

System	Herbicide & Amount	cost
Conventional Stubble Mulch	0.1 oz Ally + 1 pt. 2,4-D per acre in spring on wheat crop.	$4.22/A
	***	
Reduced Till	0.1 oz Ally + 1 pt. 2,4-D per acre in spring on wheat crop.	$4.22/A
	1 pt. Command + 1 pt. Atrazine 4L + 1 qt. Crop Oil per acre after wheat harvest.	$10.89/A
	***	
No-till	0.1 oz Ally + 1 pt. 2,4-D per acre in spring on wheat crop.	$4.22/A
	1 pt. Command + 1 pt. Atrazine 4L + 1 qt. Crop Oil per acre after wheat harvest.	$10.89/A
	16 oz. Roundup RT - three times during fallow. ($4.50/A/time)	$13.50/A

Table A2. Corn and sorghum herbicide programs used in economic analyses.

System	Herbicide & Amount	cost
No-till corn	1 pt. Command + 1 pt. Atrazine 4L + 1 qt. Crop Oil per acre after wheat harvest.	$10.89/A
	1.5 qt. Prowl + 1 qt. Atrazine 4L + 1 pt. 2,4-D per acre at planting.	$13.41/A
	0.5 pt. Banvel + 0.25 pt. 2,4-D per acre on growing corn.	$4.27/A
	***	
No-till sorghum	16 oz. Roundup RT - three times after wheat harvest and/or before sorghum planting. ($4.50/A/time)	$13.50/A
	0.75 qt. Atrazine 4L + 1.5 pt. Dual at planting.	$11.02/A
	2.5 pt. Cyclone + 1 qt. Crop Oil per acre over crop mid-season.	+9.73/A

Table A3. Millet herbicide program used in economic analyses.

System	Herbicide & Amount	Cost
No-till proso millet	16 oz. Roundup RT per acre in spring following corn.	$4.50/A
	0.25 pt. Banvel + 0.75 pt. 2,4-D per acre on growing crop.	$2.51/A

Table A4. Forage herbicide program used in economic analyses.

System	Herbicicle & Amount	cost
No-till annual forage	16 oz. Roundup RT - three times before forage planting. ($4.50/A/time)	$13.50/A
	0.25 pt. Banvel + 0.75 pt. 2,4-D per acre on growing crop.	$2.51/A

Table A5. Wheat-fallow cost and return with three types of fallow tillage, 1200 acre farm, Northeast Colorado.

			YIELD	UNITS	REVENUE
WHEAT	570	ACRES	41	BUSHEL $	87774
FALLOW	630				
TOTAL REVENUE				$	87774

	CONVENT. TILL		REDUCED TILL		NO-TILL	
	Dollars					
TOTAL RETURN		87774		87774		87774
PREHARVEST COST	21238		24476		33537	
HARVEST COST	11588		11588		11588	
TOTAL DIRECT COST		32826		36064		45125
RETURN OVER DIRECT COST		54948		51710		42649
OWNERSHIP COST		13180		13180		12621
RETURN AVAIL. FOR LAND, LABOR, CAP., MGT. & RISK		41768		38530		30028

*6o of the fallow acres are available for non-program crops.

Table A6. Wheat-corn-fallow cost and return with three types of fallow tillage, 1200 acre farm, Northeast Colorado.

		YIELD	UNITS	REVENUE
WHEAT	380 ACRES	41	BUSHEL	$ 58516
CORN	380	85	BUSHEL	74290
FALLOW	440 ACRES			
TOTAL REVENUE				$ 132806

	CONVENT. TILL		REDUCED TILL		NO-TILL	
	Dollars					
TOTAL RETURN		132806		132806		132806
PREHARVEST COST	39378		41396		46540	
HARVEST COST	17624		17624		17624	
TOTAL DIRECT COST		57002		59020		64164
RETURN OVER DIRECT COST		75804		73786		68642
OWNERSHIP COST		17113		17113		16368
RETURN AVAIL. FOR LAND, LABOR, CAP., MGT. & RISK		58691		56673		52274

*6o of the fallow acres are available fOr non-program crops.

Table A7. Wheat-corn-millet-fallow cost and return with three types of fallow tillage, 1200 acre farm, Northeast Colorado.

			YIELD	UNITS	REVENUE
WHEAT	285	ACRES	41	BUSHEL $	43887
CORN	285		85	BUSHEL	55717
MILLET	285		38	BUSHEL	27075
FALLOW	345	ACRES			
TOTAL REVENUE				$	126679

	CONVENT. TILL		REDUCED TILL		NO-TILL	
	Dollars					
TOTAL RETURN		127928		126679		126679
PREHARVEST COST	36147		37555		41333	
HARVEST COST	18901		18901		18901	
TOTAL DIRECT COST		55048		56456		60234
RETURN OVER DIRECT COST		72880		70223		66445
OWNERSHIP COST		20001		20001		19163
RETURN AVAIL. FOR LAND, LABOR, CAP., MGT. & RISK		52879		50222		47282

*60 of the fallow acres are available for non-program crops.

Table A8. Wheat-fallow cost and return with three types of fallow tillage, 1200 acre farm, Southeast Colorado.

		YIELD	UNITS	REVENUE
WHEAT	570 ACRES	34	BUSHEL $	72037
FALLOW	630 ACRES			
TOTAL REVENUE			$	72037

	CONVENT. TILL		REDUCED TILL		NO-TILL	
	Dollars					
TOTAL RETURN		72037		72037		72037
PREHARVEST COST	21238		24476		33537	
HARVEST COST	11069		11069		11069	
TOTAL DIRECT COST		32307		35545		44606
RETURN OVER DIRECT COST		39730		36492		27431
OWNERSHIP COST		13180		13180		12621
RETURN AVAIL. FOR LAND, LABOR, CAP., MGT. & RISK		26550		23312		14810

Table A9. Wheat-sorghum-fallow cost and return with three types of fallow tillage, 1200 acre farm, Southeast Colorado.

		YIELD	UNITS		REVENUE
WHEAT	380 ACRES	34	BUSHEL	$	48256
SORGHUM	380 ACRES	52	BUSHEL		44460
FALLOW	440 ACRES				
TOTAL REVENUE				$	92716

	CONVENT. TILL		REDUCED TILL		NO-TILL	
	Dollars					
TOTAL RETURN		92716		92716		92716
PREHARVEST COST	40150		42168		47312	
HARVEST COST	15648		15648		15648	
TOTAL DIRECT COST		55798		57816		62960
RETURN OVER DIRECT COST		36918		34900		29756
OWNERSHIP COST		16348		16348		15604
RETURN AVAIL. FOR LAND, LABOR, CAP., MGT. & RISK		20570		18552		14152

Table A10 Wheat-sorghum-forage-fallow cost and return with three types of fallow tillage, 1200 acre farm, Southeast Colorado

			YIELD	UNITS	REVENUE
WHEAT	285	ACRES	34	BUSHEL $	36018
SORGHUM	285	ACRES	52	BUSHEL	33345
FORAGE HAY	285	ACRES	1.3	TON	18525
FALLOW	345	ACRES			
TOTAL REVENUE				$	87888

	CONVENT. TILL		REDUCED TILL		NO-TILL	
	Dollars					
TOTAL RETURN		87888		87888		87888
PREHARVEST COST	35687		37095		40873	
HARVEST COST	17436		17436		15726	
TOTAL DIRECT COST		53123		54531		56599
RETURN OVER DIRECT COST		34765		33357		31289
OWNERSHIP COST		17907		17907		17069
RETURN AVAIL. FOR LAND, LABOR, CAP., MGT. & RISK		16858		15450		14220

Table A11. Winter wheat, per acre cost and return, conventional stubble mulch fallow tillage, Northeast Colorado.

RETURNS: WHEAT			BUSHELS PER/AC.	PRICE PER/BU	PER AC TOTALS
			41.00	3.35	137.35
GOVERNMENT PAYMENTS=			32.00	0.65	16.64 (80%)
TOTAL RETURNS					153.99
	Number	Material	Machine		
PREHARVEST COSTS:	Operation	$/acre	$/oper		
SWEEPS	5.00		1.81		9.05
RODWEED	2.00		1.36		2.72
FERTILIZE 60# N		6.00	1.22		7.22
SEEDING		4.50	1.78		6.28
WEEO SPRAY (CROP ACRES)	1.00	4.22	1.62		5.04
PICKUP TRUCK (0.4 hr/acre X $6.15/hr)			2.46		2.46
INT. 0N OP. CAPITAL					2.52
TOTAL PREHARVEST COST					36.09
HARVEST COST:					
CUSTOM COMBINE & TRUCK					15.00
STORAGE & HAULING @ $0.13/BU					5.33
TOTAL HARVEST COST					20.33
TUTAL DIRECT COST					56.42
RETURN OVER DIRECT COST					97.57
OWNERSHIP COSTS:					
TRACTOR ($15.56/hr X .65 hrs/acre)					10.11
PICKUP TRUCK					3.60
SWEEP ($2.95/hr X .18 hrs/acre)					0.53
RODWEEDER ($4.50/hr X .lhr/acre)					0.45
GRAIN DRILL ($20.88/hr X .lhr/acre)					2.09
FERTILIZER APPLIC.					0.78
SPRAYER					0.30
REAL ESTATE TAX ($2.00 X 2 ACRES)					4.00
BIN REPLACEMENT					1.00
TOTAL OWNERSHIP COST					22.86
TOTAL ALL COSTS					79.28
RETURN AVAILABLE FOR LAND, LABOR, CAPITAL AND MANAGEMENT & RISK					74.71

Table A12. Winter wheat, per acre cost and return with reduced till fallow, Northeast Colorado.

RETURNS: WHEAT			BUSHELS PER/AC.	PRICE PER/BU	PER AC TOTALS
			41.00	3.35	137.15
GOVERNMENT PAYMENTS=			32.00	0.65	16.64 (80%)
TOTAL RETURNS					153.99
PREHARVEST COSTS:	Number Operation	Material $/acre	Machine $/oper		
SWEEPS	2.00		1.81		3.62
RODWEED	1.00		1.36		1.36
FERTILIZE 60# N		6.00	1.22		7.22
SEEDING		4.50	1.78		6.28
WEED SPRAY (CROP ACRES)	1.00	4.22	1.62		5.84
WEED SPRAY (FALLOW ACRES]	1.00	10.89	1.62		12.51
PICKUP TRUCK (0.4 hr/acre X $6.15/hr)			2.46		2.46
INT. ON OP. CAPITAL					2.95
TOTAL PREHARVEST COST					42.24
HARVEST COST:					
CUSTOM COMBINE & TRUCK					15.00
STORAGE & HAULING @ $0.13/BU					5.33
TOTAL HARVEST COST					20.33
TOTAL DIRECT COST					62.57
RETURN OVER DIRECT COST					91.42
OWNERSHIP COSTS:					
TRACTOR ($15.56/hr X .65 hrs/acre)					10.11
PICKUP TRUCK					3.60
SWEEP ($2.95/hr X .65 hrs/acre)					0.53
RODWEEDER ($4.50/hr X .lhr/acre)					0.45
GRAIN DRILL ($20.88/h.r X .lh.r/acre)					2.09
FERTILIZER APPLIC.					0.78
SPRAYER					0.30
REAL ESTATE TAX ($2.00 X 2 ACRES)					4.00
BIN REPLACEMENT					1.00
TOTAL OWNERSHIP COST					22.86
TOTAL ALL COSTS					85.43
RETURN AVAILABLE FOR LAND, LABOR, CAPITAL AND MANAGEMNT & RISK					68.56

Table A13. Winter wheat, per acre cost and return with no-till fallow, Northeast Colorado.

RETURNS: WHEAT			BUSHELS PER/AC.	PRICE PER/BU	PER AC TOTALS
			41.00	3.35	137.35
GOVERNMENT PAYMENTS=			32.00	0.65	16.64 (80%)
TOTAL RETURNS					153.99
	Number	Material	Machine		
PREHARVEST COSTS:	Operation	$/acre	$/oper		
FERTILIZE 60# N		6.00	1.22		7.22
SEEDING		4.50	1.78		6.28
WEED SPRAY (CROP ACRES)	1.00	4.22	1.62		5.84
WEED SPRAY (POST HARVEST)	1.00	10.89	1.62		12.51
WEED SPRAY (FALLOW ACRES)	3.00	4.50	1.62		18.36
PICKUP TRUCK (0.4 hr/acre X $6.15/hr)			2.46		2.46
INT. ON OP. CAPITAL					3.95
TOTAL PREHARVEST COST					56.62
HARVEST COST:					
CUSTOM COMBINE & TRUCK					15.00
STORAGE & HAULING @ $0.13/BU					5.33
TOTAL HARVEST COST					20.33
TOTAL DIRECT COST					76.95
RETURN OVER DIRECT COST					77.04
OWNERSHIP COSTS:					
TRACTOR ($15.56/hr X .65 hrs/acre)					10.11
PICKUP TRUCK					3.60
GRAIN DRILL ($20.88/hr X .1hr/acre)					2.09
FERTILIZER APPLIC.					0.78
SPRAYER					0.30
REAL ESTATE TAX ($2.00 x 2 ACRES)					4.00
BIN REPLACEMENT					1.00
TOTAL OWNERSHIP COST					21.88
TOTAL ALL COSTS					98.83
RETURN AVAILABLE FOR LAND, LABOR, CAPITAL AND MANAGEMENT & RISK					55.16

Table A14. Corn, per acre cost and return, no-till, Northeast Colorado.

RETURNS:	BU Per Acre	PRICE Per bu.	TOTAL Per Acre
GROSS RETURNS:	85.00	2.30	195.50
PREHARVEST COSTS:	Material $/acre	Machine $/acre	
POST WHEAT HARVEST WEED CONTROL	10.89	1.62	12.51
HERBICIDE FOR C0RN PHASE	17.68	1.62	19.30
PLANT W/FERT		1.74	1.74
SEED	12.50		12.50
FERTILIZER P=$2.55	2.55		2.55
FERTILIZE (Nitrogen)	8.40	1.80	10.20
PICKUP TRUCK (0.4 hr/acre X $6.15/hr)		2.46	2.46
INTEREST ON OP. CAP.			4.59
TOTAL PREHARVEST COST	52.02	9.24	65.85
HARVEST COST:			
CUSTOM COMBINE & TRUCK			18.00
HAULING & STORAGE ($0.13 / bu.)			11.05
TOTAL HARVEST COST			29.05
TOTAL DIRECT COST			94.90
GROSS RETURN			100.60
OWNERSHIP COSTS:			
TRACTOR ($15.56 x 0.55 hr/acre)			8.56
PICKUP TRUCK			3.60
PUNTER & FERT.			4.25
ANHYDROUS APPLICATOR			0.78
SPRAYER			0.30
GRAIN BINS			1.00
REAL ESTATE TAX			2.00
TOTAL OWNERSHIP COST			20.49
TOTAL ALL COSTS			115.39
RETURN AVAIL. FOR LAND, LABOR, CAPITAL MANAGEMENT & RISK			80.11

Table A15. Proso millet, per acre cost and return, no-till, Northeast Colorado.

RETURNS: MILLET	BU PER/AC.	PRICE PER/BU	TOTAL
GROSS RETURNS:	38.00	2.50	95.00
	Material $/acre	Machine $/acre	$/ACRE
PREHARVEST COSTS:			
HERBICIDE ($5.50 + $1.62 appl.)	4.50	1.62	6.12
FERTILIZER (40# N)	9.20	1.45	10.65
HERBICIDE (2,4-D)	2.51	1.62	4.13
SEED PLUS DRILL	0.45	1.78	2.23
PICKUIP TRUCK (0.4 hr/acre X $6.15/hr)		2.46	2.46
Int. on Op Cap			1.92
TOTAL PREHARVEST COST			27.51
HARVEST COST:			
SWATH			1.72
CUSTOM COMBINE & TRUCK			15.00
S'IORAGE & HAULING ($0.13/BU)			4.94
TOTAL HARVEST COST			21.66
TOTAL DIRECT COST			49.17
RETURN OVER DIRECT COST			45.83
OWNERSHIIP COSTS:			
TRACTOR ($15.56 X 0.55 hr/acre)			8.56
SWATHER			4.48
PICKUP TRUCK			3.60
AUGER			0.35
ANHYDROUS APPLICATOR			0.78
GRAIN DRILL			2.09
SPRAYER			0.30
REAL ESTAT TAX/ACRE			2.00
GRAIN BINS/ACRE			1.00
TOTAL OWNERSHIIP COST			23.16
TOTAL ALL COSTS			72.33
RETURN AVAIL. FOR LAND, LABOR, CAPITAL MANAGMENT & RISK			22.67

Table A16. Winter wheat, per acre cost and return, conventional stubble mulch fallow tillage, Southeast Colorado.

RETURNS: WHEAT			BUSHELS PER/AC.	PRICE PER/BU	PER AC TOTAL
			34.00	3.35	113.90
GOVERNMENT PAYMENTS=			24.00	0.65	12.48 (80%)
TOTAL RETURNS:					126.38

PREHARVEST COSTS:	Number Opertions	Material $/acre	Machine $/oper	
SWEEPS	5.00		1.81	9.05
RODWEED	2.00		1.36	2.72
FERTILIZE 60# N		6.00	1.22	7.22
SEEDING		4.50	1.78	6.28
WEED SPRAY (CROP ACRES)	1.00	4.22	1.62	5.84
PICKUP TRUCK (0.4 hr/acre X $6.15/hr)			2.46	2.46
INT. ON OP. CAPITAL				2.52
TOTAL PREHARVEST COST				36.09
HARVEST COST:				
CUSTOM COMBINE & TRUCK				15.00
STORAGE HAULING @ $0.13/BU				4.42
TOTAL HARVEST COST				19.42
TOTAL DIRECT COST				55.51
RETURN OVER DIRECT COST				70.87
OWNERSHIP COSTS:				
TRACTOR ($15.56/hr X .65 hrs/acre)				10.11
PICKUP TRUCX				3.60
SWEEP ($2.95/hr X .18 hrs/acre)				0.53
RODWEEDER ($4.50/hr X .lhr/acre)				0.45
GRAIN DRILL ($20.88/hr X .lhr/acre)				2.09
FERTILIZER APPLIC.				0.78
SPRAYER				0.30
REAL ESTATE TAX ($2.00 X 2 ACRES)				4.00
BIN REPLACEMENT				1.00
TOTAL OWNERSHIP COST				22.86
TOTAL ALL COSTS				78.37
RETURN AVAILABLE FOR LAND, LABOR, CAPITAL AND MANAGEMENT & RISK				48.01

Table A17. Winter wheat, per acre cost and return with reduced till fallow, Southeast Colorado.

RETURNS: WHEAT		BUSHELS PER/AC.	PRICE PER/BU	PER AC TOTALS
		34.00	3.35	113.90
GOVERNMENT PAYMENTS=		24.00	0.65	12.48 (80%)
TOTAL RETURNS				126.38

PREHARVEST COSTS:	Number Opertions	Material $/acre	Machine $/oper	
SWEEPS	2.00		1.81	3.62
RODWEED	1.00		1.36	1.36
FERTILIZE 60# N		6.00	1.22	7.22
SEEDING		4.50	1.78	6.20
WEED SPRAY (CROP ACRES)	1.00	4.22	1.62	5.84
WEED SPRAY (FALLOW ACRES)	1.00	10.89	1.62	12.51
PICKUP TRUCK (0.4 hr/acre X $6.15/hr)			2.46	2.46
INT. ON OP. CAPITAL				2.95
TOTALL PREHARVEST COST				42.24
HARVEST COST				
CUSTOM COMBINE & TRUCK				15.00
STORAGE & HAULING @ $0.13/BU				4.42
TOTAL HARVEST COST				19.42
TOTAL DIRECT COST				61.66
RETURN OVER DIRECT COST				64.72
OWNERSHIP COSTS:				
TRACTOR ($15.56/hr X .65 hrs/acre)				10.11
PICKUP TRUCX				3.60
SWEEP ($2.95/hr X .18 hrs/acre)				0.53
RODWEEDER ($4.50/hr X .lhr/acre)				0.45
GRAIN DRILL ($20.88/hr X .lhr/acre)				2.09
FERTILIZER APPLIC.				0.78
SPRAYER				0.30
REAL ESTATE TAX ($2.00 X 2 ACRES)				4.00
BIN REPLACEMENT				1.00
TOI'AL OWNERSHIP COST				22.86
TOTAL ALL COSTS				84.52
RETURN AVAILABLE FOR LAND, LABOR, CAPITAL AND MANAGEMENT & RISK				41.86

Table A18. Winter wheat, per acre cost and return with no-till fallow, Southeast Colorado.

RETURNS: WHEAT			BUSHELS PER/AC.	PRICE PER/BU	PER AC TOTALS
			34.00	3.35	113.90
GOVERNMENT PAYMENTS=			24.00	0.65	12.48 (80%)
TOTAL RETURNS					126.38
	Number Opertions	Material $/acre	Machine $/oper		
PREHARVEST COSTS:					
FERTILIZE 60# N		6.00	1.22		7.22
SEEDING		4.50	1.78		6.28
WEED SPRAY (CROP ACRES)	1.00	4.22	1.62		5.84
WEED SPRAY (POST HARVEST)	1.00	10.89	1.62		12.51
WEED SPRAY (FALLOW ACRES)	3.00	4.50	1.62		18.36
PICKUP TRUCK (0.4 hr/acre X $6.15/hr)			2.46		2.46
INT. ON OP. CAPITAL					3.95
TOTAL PREHARVEST COST					56.62
HARVEST COST:					
CUSTOM COMBINE & TRUCK					15.00
STORAGE & HAULING @ $0.13/BU					4.42
TOTAL HARVEST COST					19.42
TOTAL DIRECT COST					76.04
RETURN OVER DIRECT COST					50.34
OWNERSHIP COSTS:					
TRACTOR ($15.56/hr X .65 hrs/acre)					10.11
PICKUP TRUCK					3.60
W DRILL ($20.88/hr X .lhr/acre)					2.09
FERTILIZER APPLIC.					0.78
SPRAYER					0.30
REAL ESTATE TAX ($2.00 X 2 ACRES)					4.00
BIN REPLACEMENT					1.00
TO1'AL OWNERSHIP COST					21.88
TOTAL ALL COSTS					97.92
RETURN AVAILABLE FOR LAND, LABOR, CAPITAL AND MANAGEMENT & RISK					28.46

Table A19. Sorghum, per acre cost and return, no-till, Southeast Colorado.

RETURNS:	BU Per Acre	PRICE Per bu.	TOTAL Per Acre
GROSS RETURNS:	52.00	2.25	117.00
PREHARVEST COSTS:	Material $/acre	Machine $/acre	
WEED CONTROL (3 OPERATIONS)	13.50	4.86	18.36
HERBICIOE FOR SORGHUM PHASE	2.75	3.24	23.99
PLANT W/FERT		1.74	1.74
SEED (l0#/ACRE)	3.85		3.85
FERTILIZER P=$2.55	2.55		2.55
FERTILIZE (Nitrogen)	8.40	1.80	10.20
PICKUP TRUCK (0.4 hr/acre X $6.15/hr)		2.46	2.46
INTEREST ON OP. CAP.			4.74
TOTAL PREHARVEST COST	49.05	14.10	67.89
HARVEST COST:			
CUSTOM COMBINE & TRUCK			15.00
HAULING & STORAGE ($0.13 / bu.)			6.76
TOTAL HARVEST COST			21.76
TOTAL DIRECT COST			89.65
GROSS RETURN			27.35
OWNERSHIP COSTS:			
TRACTOR ($15.56/hr X .55 hr/acre)			8,56
PICKUP TRUCK			3.60
PLANTER & FERT.			3.22
ANHYDROUS APPLICATOR			0.18
SPRAYER			0.30
GRAIN BINS			1.00
REAL ESTATE TAX			2.00
TOTAL OWNERSHIP COST			19.46
TOTAL ALL COSTS			109.11
RETURN AVAIL. FOR IAND, LABOR, CAPITAL MANAGEMENT & RISK			7.89

Table A20. Continous grain sorghum, per acre cost and return, no-till Southeast Colorado.

RETURNS:	BU Per Acre	PRICE Per bu.	TOTAL Per Acre
GROSS RETURNS:	47.00	2.25	105.75
PREHARVEST COSTS:	**Material $/acre**	**Machine $/acre**	
WEED CONTROL (3 OPERATIONS)	**13.50**	**4.86**	18.36
HERBICIDE FOR SORGHUM PHASE	**20.75**	**3.24**	23.99
PLANT W/FERT		**1.74**	1.74
SEED (10#/ACRE)	**3.85**		3.85
FERTILIZER P=$2.55	**2.55**		2.55
FERTILIZE (Nitrogen)	**8.40**	**1.80**	10.20
PICKUP TRUCK (0.4 hr/acre X $6.15/hr)		**2.46**	2.46
INTEREST ON OP. CAP.			4.74
TOTAL PREHARVEST COST	49.05	14.10	67.89
HARVEST COST:			
CUSTOM COMBINE & TRUCK			15.00
HAULING & STORAGE ($0.13 / bu.)			6.11
TOTAL HARVEST COST			21.11
TOTAL DIRECT COST			89.00
GROSS RETURN			16.75
OWNERSHIP COSTS:			
TRACTOR ($15.56/hr X .55 hr/acre)			8.56
PICKUP TRUCK			3.60
PLANTER & FERT.			3.22
ANHYDROUS APPLICATOR			0.78
SPRAYER			0.30
GRAIN BINS			1.00
REAL ESTATE TAX			2.00
TOTAL OWNERSHIP COST			19.46
TOTAL ALL COSTS			108.46
RETURN AVAIL. FOR LAND, LABOR, CAPITAL MANAGMENT @ RISK			-2.71

Table A21. Forage hay, per acre cost and return, no-till, Southeast Colorado.

	TON PER/AC.	PRICE PER/TON	TOTAL	
GROSS RETURNS:	**1.30**	**50.00**	**65.00**	
PREHARVEST COSTS:	Number Oper.	Material $/acre	Machine $/acre	$/ACRE
HERBICIDE	3.00	4.50	1.62	18.16
FERTILIZER (40# N)		9.20	1.45	10.65
SEED PLUS DRILL		2.70	1.78	4.48
PICKUP TRUCK (0.4 hr/acre X $6.15/hr)			2.46	2.46
Int. on Op cap				2.70
TOTAL PREHARVEST COST				38.65
HARVEST COST:				
CUSTOM SWATH				6.00
CUSTOM BALING (1300# LG. RD. @ $6/BALE)				12.00
LIFTING & MOVING ($1/BALE)				2.00
TOTAL HARVEST COST				20.00
TOTAL DIRECT COST				58.65
RETURN OVER DIRECT COST				6.35
OWNERSHIP COSTS:				
TRACTOR ($8.85/hr X .6 hr/acre)				5.31
PICKUP TRUCK				3.60
ANHYDROUS APPLICATOR				0.78
GRAIN DRILL				2.09
SPRAYER				0.30
REAL ESTATE TAX/ACRE				2.00
TOTAL OWNERSHIP COST				14.08
TOTAL ALL COSTS				72.73
RETURN AVAIL. FOR LAND, LABOR, CAPITAL MANAGEMENT & RISK				-7.73